U.S. Environmental Protection Agency
Office of Research and Development

Charge for the BOSC Water Quality Subcommittee

1.0 Objective. The objective of this review is to evaluate the relevance, quality, performance, and scientific leadership of the Office of Research and Development's (ORD's) Water Quality Research Program.

The independent external peer panel's evaluation and recommendations will then provide guidance for ORD to:

- strengthen, plan, and implement the program and its research investment decisions;
- prepare the Agency's performance and accountability reports to Congress under the Government Performance and Results Act; and
- improve coordination with other programs designed to achieve similar outcomes in other parts of the Environmental Protection Agency (the Agency) and in other federal agencies.

The independent review will also provide the most pertinent information for evaluations of federal research conducted by the Office of Management and Budget (OMB). OMB highlights the value of recommendations from independent expert panels in its guidance to federal agencies regarding improvement and reaching articulated goals[1,2].

2.0 Background Information. Independent expert review is used extensively in industry, federal agencies, Congressional committees, and academia. The National Academy of Science has recommended this approach for evaluating federal research programs.[3]

Because of the nature of research, it is not easy to measure the creation of new knowledge as it develops, nor the pace at which research progresses or scientific breakthroughs occur. Demonstrating research contributions to outcomes is very challenging[4] when federal agencies conduct research to provide input for regulatory decisions, and then rely on third parties[5] (such as state environmental agencies) to enforce the regulations and demonstrate environmental improvements.

Typically, many years may be required for practical research applications to be developed, and decades may be required for some research public benefit outcomes to be achieved and quantified.

Most of the Agency's environmental research programs investigate complex environmental problems and processes, combining use-inspired basic research[6,7] with applied research and integrating several scientific disciplines across a conceptual framework[8] that links research to environmental decisions or outcomes. In multi-disciplinary research programs such as these, progress toward outcomes cannot usually be measured by outputs created in a single year. Rather, research progress occurs over several years, as research teams explore hypotheses with individual studies, interpret research findings, and then develop hypotheses for future investigations.

In designing and managing its research programs, ORD emphasizes the importance of identifying priority research questions or topics to guide the research directions. Similarly, ORD recommends that its programs develop a small number of performance goals which serve as indicators of progress to answer the priority questions and to accomplish outcomes. Short-term outcomes are accomplished when research is applied by specific clients to strengthen environmental decisions or regulations. These decisions and resulting actions (e.g., reducing or preventing exposure of humans to environmental stressors posing a high risk) ultimately contribute to the improved health of the American public or to the protection of ecosystems.

In a comprehensive evaluation of EPA's science and research, the National Research Council recommended[9] that the Agency substantially increase its efforts to explain the significance of its research products and to assist internal and external Agency clients in applying them. In response to this recommendation, ORD has engaged science advisors from client organizations to serve as members of its research program teams. These teams help identify research contributions with significant decision-making value and help plan for their transfer and application.

For the Agency's environmental research programs, periodic retrospective analysis is conducted at intervals of four or five years. Conducting program evaluation at this interval enables assessment of research inputs, progress, its scientific quality and decision-making value, whether research has been applied by specific clients**,** and whether health and environmental outcomes are quantifiable in the short-term.

A description of the Office of Science and Technology Policy/Office of Management and Budget (OSTP/OMB) *Research and Development Investment Criteria* is included in Appendix I. These investment criteria of relevance, quality, performance and leadership of the scientific program on Water Quality are pertinent to the draft charge questions, as are the coordination and communication of research activities.

3.0 Draft Charge Questions for ORD's Water Quality Research Program

The following charge questions should be used to facilitate the peer evaluation of the relevance, quality, performance, and scientific leadership of ORD's water quality research, and the coordination and communication of that research:

Relevance

1. How is the focus of ORD's Water Quality (WQ) Research Program, as reflected in the MYP**,** relevant to the Agency's Goal 2 and strategic goals, and to recommendations for WQ research priorities developed by the National Research Council, Science Advisory Board and the EPA Office of Water (OW), States and Regions?
2. How does the research program use the MYP to help guide and manage its research?
3. How does the WQ research program address and respond to key and emerging scientific questions?

Quality

1. How does the Program ensure quality through competitive and merit-based funding?
2. What procedures (e.g. use of peer-review) does the Program have to ensure the quality of its products?

Performance

A. Program Design

1. What is the logic underlying the program design (based on MYP LTGs)?
2. How well are the program goals and priorities identified?
3. How well is the rationale for the research articulated?
4. Is research appropriately sequenced?
5. How have client needs been anticipated?
6. How can the program be improved?

B. Program Progress:

1. What evidence has been presented to demonstrate that significant progress has been made toward each of the Long-Term Goals?
2. How have clients applied the program's research in environmental decisions and regulations?
3. What suggests that the program has met client needs in a timely and useful way?

Scientific Leadership

1. How has the Program played a leadership role in advancing the state-of-the-science of water quality research and in solving important research problems?
2. How have water quality researchers demonstrated leadership in their respective disciplines?

Coordination and Communication

1. How are key stakeholders (e.g., Program, Regional Offices, state and local governments) involved in research planning and prioritization?
2. How has the program demonstrated collaboration with other agencies (inside and outside the government; nationally and internationally) in advancing the EPA's research agenda?
3. What important interagency collaborations should and can be improved to advance the Agency's research agenda?
4. How does the program use effective mechanisms for communicating research activities and results, both internally and externally?
5. To what extent have research results been published and cited in peer reviewed literature?
6. How has the program provided expertise to clients applying research products?
7. How well are program benefits articulated?

References

[1] Budget Data Request 04-31. Executive Office of the President, Office of Management and Budget. March 22, 2004. "Completing the Program Assessment Rating Tool (PART) for the FY06 Review Process," pages 50-56.

[2] Memorandum for the Heads of Executive Departments and Agencies. Executive Office of the President, Office of Management and Budget. June 5, 2003. "FY 2005 Interagency Research and Development Priorities," pages 5-10.

[3] Evaluating Federal Research under the Government Performance and Results Act (National Research Council, 1999).

[4] The House Science Subcommittee. Letter to Dr. Bruce Alberts, President of the National Academy of Sciences, from F. James Sensenbrenner, Jr. and George E. Brown. October 23, 1997.

[5] The Government Performance and Results Act: 1997 Governmentwide Implementation Will Be Uneven. U.S. General Accounting Office. (GAO/GGD, 1997).

[6] Building a Foundation for Sound Environmental Decisions. (National Research Council, 1997).

[7] "Renewing the Compact between Science and Government," Stokes, D.E., in *1995 Forum Proceedings, Vannevar Bush II—Science for the 21st Century*. Pages 15-32. Sigma Xi, 1995.

[8] Risk Assessment in the Federal Government: Managing the Process. (National Research Council, 1983).

[9] Strengthening Science at the U.S. Environmental Protection Agency. (National Research Council, 2000, p 141).